

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN THE APPLICATION OF: DONALD L. CLASON

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GROUP ART UNIT: 1714

TITLE: HYDRAULIC COMPOSITION CONTAINING A SUBSTANTIALLY
NITROGEN FREE DISPERSANT

Wickliffe, Ohio

Sir:

Declaration Under Rule 1.132

I, Betsy Butke, have been employed by The Lubrizol Corporation as a chemist since 1980. I obtained a M.S. from The Cleveland State University in 1988 in the field of chemistry and have 29 years experience in research in the preparation and formulation of additives and for use in lubricants and hydraulic fluids.

The inventor Donald Clason has retired and I am responsible for a number of projects instigated by Donald Clason. One of the projects includes the technology associated with the present invention.

Five substantially identical hydraulic formulations were prepared under my supervision. The formulations have essentially equal amounts of antioxidants, metal deactivators, and antifoam agents. The differences between the hydraulic formulations are shown in the table below. The differences relate to the amounts of the key formulation components contributing to the performance of the present invention i.e., the dispersant and the zinc dialkyldithiophosphate (ZDDP). In addition, the ZDDP may be either primary (i.e., presently claimed) or secondary (comparative). In the table the wt % indicated for each additive is presented on an actives basis i.e., conventional amounts of diluent oil known to be present with dispersants has not been included.

Claimed Additive	Amount of Chemical Additive (wt %)				
	RF1	RF2	L1	L2	L3
wt % of dispersant	0.2	0.2	0.2	0.2	1.0

primary ZDDP	0.3	0.2	1.0	0.6	2.0
secondary ZDDP	0.2	0	0	0	0
phosphorus from ZDDP	0.053	0.014	0.096	0.055	0.142

The formulations above were evaluated by standard tests described in ASTM D1401, ASTM D2272, ASTM 2619 and ASTM D943. The ASTM D2272, ASTM 2619 and ASTM D943 tests are mentioned in more detail in my declaration submitted on 13 October, 2007.

ASTM D1401 evaluates the ability of petroleum oils or synthetic fluids to separate from water.

The four ASTM tests are tests that a lubricant is expected to perform well in if said lubricant is to perform well in a vehicle hydraulic system capable of transferring rotational energy into a stored energy reservoir and later reconvert the stored energy to aid propulsion.

The test data obtained is summarised in the table below.

Test	Pass/Desired Result	Lubricant				
ASTM D2272		RF1	RF2	L1	L2	L3
Oxidation stability in minutes	Longer Test Times	174	190	288	274	357
ASTM 2619		RF1	RF2	L1	L2	L3
Change in Copper Weight (mg/cm ²)	Limit -0.2	-0.1	-0.2	-0.15	0	-0.1

RF1 is a lubricant containing a mixture of primary and secondary ZDDP. The oxidation stability results reported are poor. In contrast lubricants of the present invention L1 to L3 have significantly higher oxidation stability.

RF2 is a comparative lubricant similar to the present invention except it contains only 0.2 wt % of primary ZDDP. The results obtained for it indicate that whilst the lubricant contains primary ZDDP, having less than about 0.4 wt % results in a lubricant with oxidation times considerably less than the claimed range of about 0.4 wt % to about 2 wt % of ZDDP. This is observed by the fact that RF2 has an oxidation stability of 190 minutes versus 274 to 357 obtained for L1 to L3.

The data above indicates that the inventive lubricants L1 to L3, containing 1 wt %, 0.6 wt % and 2 wt % of primary ZDDP respectively, easily pass and/or perform surprisingly better than the reference examples in ASTM D2272 and ASTM 2619 tests. The data indicates that the claimed invention specifying 0.4 wt % to 2 wt % of primary ZDDP works across the claimed range.

The data also demonstrates that lubricants having about 0.2 wt % to about 1 wt % of a substantially nitrogen free dispersant, derived from the reaction product of: (i) a polyalkenyl-substituted acylating agent, wherein the polyalkenyl-substituted acylating agent is polyisobutenyl succinic anhydride; and (ii) a polyol, wherein the polyol is pentaerythritol, provide improved performance in ASTM tests D2272 and D2619 over the reference samples.

Accordingly the data above demonstrates that a composition comprising:

(a) about 0.2 wt % to about 1 wt % of a substantially nitrogen free dispersant derived from the reaction product of:

(i) a polyalkenyl-substituted acylating agent, wherein the polyalkenyl-substituted acylating agent is polyisobutenyl succinic anhydride; and

(ii) a polyol, wherein the polyol is pentaerythritol;

(b) an oil of lubricating viscosity; and

(c) about 0.4 wt % to about 2 wt % of a zinc hydrocarbyl dithiophosphate wherein component (c) consists essentially of primary zinc hydrocarbyl dithiophosphates, is capable of providing the performance benefits for lubricating a vehicle hydraulic system capable of transferring rotational energy into a stored energy reservoir and later reconverting the stored energy to rotational energy to aid propulsion, and does so surprisingly better than the reference samples which do not contain these features.

I further declare that all statements herein made of my own knowledge are true and all statements herein made on information and belief are believed to be true. I understand that willful false statements and the like are punishable by fine or imprisonment or both (18 U.S.C. 1001) and may jeopardize the validity of the application or any patent issuing thereon.

Betsy Butke
Betsy Butke

8/24/09
Date